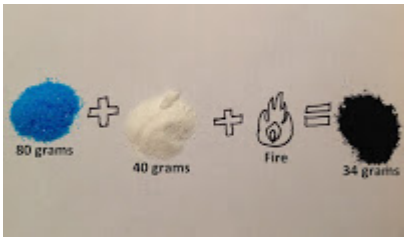
Experiment 54: Making Copper Oxide for Thermite

Next on my list of thermite reactions I want to try is copper. For that, I will need copper (II) oxide to react with my homemade ball-milled aluminum powder. I saw a nice video by zhmapper on YouTube about making copper (II) oxide, so I decided to try his method myself.



To start, I made concentrated solutions of copper sulfate (root killer) and sodium carbonate (washing soda). I used about a 2:1 mass ratio of these solids and completely dissolved each. Baking soda (sodium hydrogen carbonate) would work just as well, but the ratio might be different. With my solutions prepared, I mixed them thoroughly together. This made a lot of bubbles, so I had to quickly transfer my experiment to a larger container. When the solutions mix, they make copper carbonate, which can be decomposed into copper (II) oxide. I knew that I had added enough sodium carbonate because the blue color of the solution became clear (once the blue copper carbonate had settled out).

The byproduct of the reaction is sodium sulfate, so I filtered this off, along with the excess water, using simple coffee filters. When the copper carbonate dried, I was left with a robin's-egg-blue powder. To transform the copper carbonate into copper (II) oxide by releasing CO_2gas, I heated the powder in a soup can. My hot plate wasn't hot enough, so I put the can in a bonfire for 15 minutes. When everything had cooled, I was left with a dark black powder--the copper (II) oxide. I also noticed some pink inside the can, so I wonder if the fire was somehow reducing some of the copper oxide back into copper metal.

Untouched, the copper oxide would probably work. I have heard that copper thermite is very energetic, so it probably doesn't require extra fine ingredients. However, I want the best performance from this reaction, so I milled the powder by hand using some steel ball bearings in a plastic jar. Shaken enough, the bearings break up any clumps. I also ran a magnet in a plastic bag over the powder to remove magnetic particles that came from the soup can. I was left with 55 grams of fine copper (II) oxide powder for an exciting thermite reaction.